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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] The cutting-edge unit equipped with the outside cutting edge can float to a body, and this invention relates to the electric shaver which can adjust the mounting height of a cutting-edge unit.

[0002]

[Description of the Prior Art] Conventionally, as for the electric shaver which equipped the outside cutting edge with the float device, per skin is good, and since the adhesion of the skin and an outside cutting edge increases, it can be shaved, and a float will give resiliency to an outside cutting edge, and an outside cutting edge can touch the skin softly to the irregularity of the skin, and it can lessen remnants. Moreover, there is also an electric shaver with which the mounting height of an outside cutting edge is adjusted, the float force of an outside cutting edge and an inner cutting edge push up to the thickness of each user's mustache, the weakness of the skin, how to shave, and how to push, and a user adjusts the force to an optimum value.

[0003]

[Problem(s) to be Solved by the Invention] however, the conventional electrical and electric equipment or by changing the mounting height of an outside cutting edge, if it sees and is in camber, an actuation load changes, the rotational frequency of an inner cutting edge falls, and there is a problem that sharpness worsens, or a rotational frequency goes up and per skin worsens.

[0004] Moreover, although it is the mode which a person with the weak skin and a person with a thin mustache use in the electric shaver into which the mounting height of an outside cutting edge is changed when outside edge height is in the upper location The upward force of *** becomes small on structure, and ***** becomes high rather than the time of an outside cutting edge being downward. Conversely, the rotational frequency fell off in the mode which has the outside cutting edge which a person with a deep mustache and those who want to ***** want to use powerfully at a higher rotational frequency in a bottom location, and there was a problem to which the actuation speed of an inner cutting edge falls, and sharpness worsens.

[0005] The place which invents this invention in view of the trouble of the above-mentioned conventional example, and is made into the object By the mounting height of a cutting-edge unit being interlocked with, and adjusting the actuation speed of an inner cutting edge An actuation load like before changes and the actuation speed of an inner cutting edge falls. Sharpness worsens or Or actuation speed increases, per skin does not worsen and it is in offering the electric shaver which can obtain the actuation speed of the optimal inner cutting edge in each mode in the mode in which per skin is improved, and the mode in which sharpness is improved.

[0006]

[Means for Solving the Problem] If it is in this invention in order to solve the above-mentioned technical problem The cutting-edge unit 200 equipped with the outside cutting edge 14 can float to a body 301. And it sets to the electric shaver with which adjustment of the mounting height of the cutting-edge unit 200 was attained. With it being characterized by establishing the inner cutting-edge actuation control means 302 which is interlocked with the mounting height of the cutting-edge unit 200, and adjusts the actuation speed of the inner cutting edge 4, and constituting in this way It can adjust now so that sharpness does not worsen, or the actuation speed of the inner cutting edge 4 may fall, actuation speed may increase and per skin may not worsen, even if an actuation load changes.

[0007] Moreover, it is desirable to have a location detection means 303 to detect the location of the above-mentioned cutting-edge unit 200, and a means to be interlocked with the location of the cutting-edge unit 200, and to control a motor 3, and adjustment of the actuation speed of the inner cutting edge 4 serves as accuracy by interlocking location detection of the cutting-edge unit 200, and control of a motor 3

in this case.

[0008] Moreover, as for the location detection means 303 of the above-mentioned cutting-edge unit 200, it is desirable to detect the location of the actuation means 304 for making the cutting-edge unit 200 go up and down.

[0009] Moreover, it is desirable to have the 1st connection section connected with the member which moves the cutting-edge unit 200 up and down at the tooth back, and the 2nd connection section connected with the part which detects the mounting height of the cutting-edge unit 200 while an actuation means 304 to move the above-mentioned cutting-edge unit 200 up and down is equipped with the control unit arranged on the outside of a body 301.

[0010] Moreover, as for the above-mentioned location detection means 303, it is desirable to consist of one switch 8 which detects two or more locations of the member combined so that the cutting-edge unit 200 might be interlocked with and it might fluctuate.

[0011] Moreover, the above-mentioned body 301 is made into waterproof construction, the revolving-shaft section 72 is formed in the member which tells actuation of the actuation means 304 arranged on the outside of a body 301 inside a body 301, it is desirable to come to carry out the seal of between the revolving-shaft section 72 and the bearings of a body 301 with an O ring, and the dependability of water proof between the actuation means 304 and the body 301 interior increases in this case.

[0012] moreover, it is desirable to adjust the actuation speed of the inner cutting edge 4 by the electrical and electric equipment of a both-way formula or seeing and adjusting the amplitude of the inner cutting edge 4 in camber.

[0013] moreover, it is desirable to adjust the actuation speed of the inner cutting edge 4 by the electrical and electric equipment of a rotating type or seeing and controlling the rotational frequency of the inner cutting edge 4 in camber.

[0014] Moreover, the cutting-edge unit 200 with which this invention was equipped with the outside cutting edge 14 can float to a body 301. And it sets to the electric shaver with which adjustment of the mounting height of the cutting-edge unit 200 was attained. It is being characterized by having the inner cutting-edge actuation control means 302 which controls the actuation speed of the inner cutting edge 4 uniformly regardless of the mounting height of the cutting-edge unit 200, and constituting in this way. When per skin worsens when the mounting height of the cutting-edge unit 200 is in a high location, or it is in a low location, the evil in which sharpness worsens can be abolished.

[0015] Moreover, by detecting the actuation speed of the above-mentioned motor 3, regardless of the mounting height of the cutting-edge unit 200, it is desirable to control the actuation speed of the inner cutting edge 4 uniformly, and it can control easily so that the actuation speed of a motor 3 becomes fixed by the approach of detecting the reverse electromotive voltage by motorised in this case etc.

[0016] Moreover, the cutting-edge actuation control means 302 in the above makes late actuation speed of the inner cutting edge 4, when the mounting height of the cutting-edge unit 200 is in a high location. And it is desirable to adjust so that actuation speed of the inner cutting edge 4 may be made quick, when the mounting height of the cutting-edge unit 200 is in a low location, when it is in the location where the mounting height of the cutting-edge unit 200 is high in this case, per skin becomes good more and sharpness becomes good more at the low time of a location.

[0017] Moreover, as for the location detection means 303 of the above-mentioned cutting-edge unit 200, it is desirable to detect the location of the member arranged so that the cutting-edge unit 200 may be interlocked with and it may fluctuate.

[0018] Moreover, as for the location detection means 303 of the above-mentioned cutting-edge unit 200, it is desirable to detect a motion of this member by preparing protection-from-light section 139a in the member which is interlocked with the cutting-edge unit 200 and gone up and down, and interrupting the beam of light from a light emitting device N by protection-from-light section 139a.

[0019] Moreover, as for the location detection means 303 of the above-mentioned cutting-edge unit 200, it is desirable to consist of two or more switches F and G in which ON/OFF is carried out by the member interlocked with the cutting-edge unit 200.

[0020] Moreover, as for a means to control the above-mentioned motor, it is desirable to consist of a variable resistor 310 which controls the current which is interlocked with the attaching position of the cutting-edge unit 200, and flows on a motor 3, and the resistance value change of a variable resistor 310 can adjust actuation speed of a motor 3 simply in this case.

[0021] Moreover, it is desirable to arrange the above-mentioned variable resistor 310 to a motor 3 and a serial.

[0022] Moreover, it is desirable that the above-mentioned cutting-edge unit 200 is interlocked with, have the combined member so that it may fluctuate, and the member itself constitutes the variable resistor 310.

[0023] Moreover, it is desirable that a part of actuation means 304 for going up and down the above-

mentioned cutting-edge unit 200 constitutes a variable resistor 310.

[0024] Moreover, it is desirable to constitute the rotary volume K on the actuation means 304 of the above-mentioned rotating type and the same axle.

[0025]

[Embodiment of the Invention] Hereafter, this invention is explained based on the operation gestalt shown in an accompanying drawing.

[0026] An example of an electric shaver is shown in drawing 1 - drawing 9. The pedestal 5 holding a battery 2, a motor 3 like a linear motor and a battery 2 and a motor 3, and the circuit board 26 is stored in the interior of the tubed body housing 1. The motor 3 equips the upper part with the actuation child 12 who transmits driving force to the inner cutting edge 4. Upside opening of the body housing 1 is closed by the cutting-edge mount 6 by the side of a body 301, and bottom opening is closed by the discharge ring 7.

[0027] As shown in drawing 7 and drawing 8, the cutting-edge mount 11 is fixed to the upper part of the cutting-edge mount 6 by the side of a body 301 using a screw. There is opening in the up-and-down cutting-edge mounts 6 and 11, respectively, the actuation child 12 of a motor 3 penetrates the opening, the O ring section 48 inside actuation child water proof rubber 13 fits into the actuation child's 12 water seal section 49, and the periphery section 50 of actuation child water proof rubber 13 is inserted between the up-and-down cutting-edge mount 6 and the cutting-edge mount 11.

[0028] Moreover, the cutting-edge mount 6 and the body housing 1 by the side of a body 301 sandwich O ring 28 really fabricated by the cutting-edge mount 6 in the pars intermedia, and are fixed on both sides of a front panel 29 (drawing 4) and the top ring 27 with the up side. The discharge ring 7 is considering the body housing 1 interior as water proof by really fabricating rubber in the periphery section and the screw hole section used as a mating face with the body housing 1, or assembling it on both sides of an O ring in them.

[0029] The front face of the body housing 1 is equipped with the switch 8 (drawing 4) of the push type which penetrated opening of a front panel 29 on both sides of switch water proof rubber 9, and the Tolima unit 10 (drawing 5) is arranged in it free [a slide] in the tooth back of the body housing 1.

[0030] The inner cutting-edge Oshiage spring 22 is arranged in the actuation child 12 with the spring stop member 40, and the inner cutting edge 4 is always forced on him to the outside cutting edge 14 (drawing 6) for the elasticity of the inner cutting-edge Oshiage spring 22. Moreover, the Tolima driving rod 115 and slit cutting-edge driving rod 51a (drawing 5) are attached in the actuation child's 12 side face for an actuator, and it enables it to transmit actuation to the Tolima unit 10 and the slit cutting edge 44 (drawing 6), respectively.

[0031] The head section consists of a cutting-edge unit 200 equipped with two network cutting-edge units 80 and 80 and the central slit cutting edge 44 approximately as shown in drawing 6, and a cutting-edge frame 18 which supports this free [a float], and the cutting-edge frame 18 equips two longitudinal direction ends with the engagement section for the engagement in which a body 301 and attachment and detachment are free.

[0032] As shown in drawing 7, the upper cutting-edge mount 11 was arranged and the height 23 of a configuration which meets the peripheral face of the cutting-edge frame 18 is provided in the right-and-left both ends of this cutting-edge mount 11 upside at cutting-edge mount 6 upper bed by the side of a body 301. Between heights 23, it has the notching 79 of a lengthwise direction, and the opening hole 370 is formed behind the left forward right between the heights 23 before and behind a total of four heights 23.

[0033] Next, the adjustment device of the mounting height of the cutting-edge unit 200 is explained.

[0034] As shown in drawing 7, the change-over plate 21 which carried out the shape of a typeface of abbreviation KO is arranged in the location surrounded by the lower periphery of the cutting-edge mount 6 by the side of a body 301, and the inner circumference of a front panel 29 movable in the vertical direction. The slot 24 of a long truck configuration is formed in the both ends of the change-over plate 21 in the vertical direction, and fitting of the round-head boss 30 for a float who prepared in the slide hook 25 is carried out to a slot 24. The elastic leg 34 which has elasticity so that float nature may not be spoiled is formed in the slide hook 25. Moreover, the fixed joint of the slide hook 25 and the change-over plate 21 is performed by the round-head boss 33 of the slide hook 25 which penetrates the hole 32 established in the center section of the change-over plate 21.

[0035] The slide hook 25 is equipped with the stop hook section 31 for penetrating the opening hole 370 of the cutting-edge mount 11, and engaging with the engagement section 20 of a projection and the cutting-edge frame 18 from a top face.

[0036] As a device for making the change-over plate 21 slide in the vertical direction, the dial 53 used as the control unit of the actuation means 304 is used. A dial 53 is positioned in the circular hole 77 (drawing 4) constituted by the crevice of engagement projection 6a which projected from the cutting-edge mount 6 by the side of a body 301, and a front panel 29.

[0037] In the hole 58 (drawing 7) of the center of a dial 53, engagement projection 6a of the cutting-edge mount 6 by the side of a body 301 has penetrated. Tapped hole 6b is prepared in the core of engagement projection 6a. The presser-foot plate 61 is fixed to the cutting-edge mount 6, a dial 53 is ****ed, and it can be made to carry out by hand by ****(ing) the presser-foot plate 61 in which the notch 60 was formed on the front face of a dial 53, inserting a screw thread 62 in the presser-foot plate 61 and the hole 59 of a dial 53, and thrusting into engagement projection 6a of the cutting-edge mount 6 revolution actuation centering on 62. A display like "powerful", "normal", and "mild" is given to the front face of a dial 53. When a dial 53 is rotated, the presser-foot plate 61 is fixed, the above-mentioned display can be seen from a notch 60, and the setting-out location of the cutting-edge unit 200 is known. 63 in drawing 8 ****s and is the hiding plate of 62.

[0038] As shown in drawing 10 , the cam groove 52 which carried out eccentricity from the bottom of its heart during the revolution is formed in the inner surface side of the dial 53 of the above-mentioned rotary system. A dial 53 is arranged free [a revolution] through the opening hole of the front panel 29 at the cutting-edge mount 6.

[0039] a change-over -- a plate -- 21 -- association -- said -- having carried out -- a slide -- a hook -- 25 -- a round head -- a boss -- 33 -- a cam shaft -- ** -- carrying out -- a dial -- 53 -- a rear face -- eccentricity -- having carried out -- a cam groove -- 52 -- sliding -- free -- joining together -- KO -- a typeface -- ** -- a cutting edge -- a mount -- six -- inserting -- being crowded -- thereby -- a longitudinal direction -- actuation -- regulating -- having had -- a change-over -- a plate -- 21 -- the movement toward the upper and lower sides -- being possible . If a dial 53 is turned, the distance of the cam groove 52 on the back and a center of rotation will change. In order that the round-head boss 33 of the slide hook 25 used as the cam shaft combined with this cam groove 52 may slide along with a cam groove 52, he receives the force of the vertical direction with the eccentricity of a cam groove 52, tells power to the change-over plate 21, and is made to slide to up down one.

[0040] Thus, by rotating a dial 53, the cutting-edge frame 18 can be made to be able to go up and down through the slide hook 25, and the mounting height of the cutting-edge unit 200 can be adjusted in the vertical direction to the inner cutting edge 4.

[0041] As shown in drawing 10 - drawing 12 , still more nearly another cam groove 51 is formed inside the cam groove 52, and it has fitted into the rear face of a dial 53 with the round-head boss 71 (the 2nd connection section) of the switch cam 70. The switch cam 70 is supported free [a revolution] by the round hole section 380 (drawing 8) prepared in the cutting-edge mount 6 through O ring 73 (drawing 8), is equipped with the engagement rib 74 at the head of the revolving-shaft section 72 (drawing 12) of the switch cam 70, and is making the engagement rib 74 engage with the engagement slot 76 (drawing 8) of the cam lever 75 arranged to the body 301 inside. Actuation of the dial 53 on body 301 outside is told to the cam lever 75 of the body 301 inside through the revolving-shaft section 72 of the switch cam 70, and is raising waterproof dependability by taking the structure waterproofed with the revolving-shaft section 72 and O ring 73.

[0042] As shown in drawing 8 , the switch holder 381 is held in the engagement section 82 at the coat section 79 of a motor 3. The cam lever 75, the change lever 83, the circuit changing switch 85, and the switch cover 88 are attached in the switch holder 381, a cam lever 75 is supported by the change lever 83 free [a vertical slide] free [a revolution], and the switch body 86 (drawing 13 (a)) of a circuit changing switch 85 is being fixed by the switch holder 381 and the switch cover 88. Rotation told to the body 301 interior is changed into both-way slide motion by the cam lever 75 and the change lever 83. The engagement slot 84 of the change lever 83 is engaging with the switch section 87 of a circuit changing switch 85, and a switch is changed by both-way slide motion of the change lever 83.

[0043] It detects in which location of three conditions of drawing 13 , (a), (b), and (c), a circuit changing switch 85 has the switch section 87, and the signal is told to the circuit board 26 through a current carrying part 89, it is fed back to the current passed on a motor 3, and the amplitude of the inner cutting edge 4 is controlled.

[0044] Thus, it was interlocked with that the mounting height of the cutting-edge unit 200 is adjusted by actuation of a dial 53, and the location of the cutting-edge unit 200 is detected by telling actuation of a dial 53 to the circuit changing switch 85 which can detect two or more locations. And a motor 3 is controlled based on the location of the detected cutting-edge unit 200, and the amplitude of the inner cutting edge 4 is adjusted. The block diagram of this example is shown in drawing 27 .

[0045] The actuation speed of the optimal inner cutting edge 4 is obtained in each mode in the mode in which the actuation speed of the inner cutting edge 4 falls, actuation speed increases, per skin does not worsen [sharpness does not worsen, or], and per skin is improved by a deer being carried out, the mounting height of the cutting-edge unit 200 being interlocked with, and the actuation speed of the inner cutting edge 4 being adjusted even if an actuation load changes, and the mode in which sharpness is

improved. Consequently, it can abolish spoiling per skin and sharpness.

[0046] Here, although drawing 1 - drawing 9 are the operation gestalten at the time of using a motor 3 and the actuation speed of the inner cutting edge 4 is adjusted by changing motor 3 amplitude, when a rotary motor is used, the actuation speed of the inner cutting edge 4 can be adjusted by changing a motor rotational frequency.

[0047] Drawing 14 is the graph which compared change of the actuation speed of the inner cutting edge 4 for the difference arising from the existence of the actuation speed adjustment function of the inner cutting edge 4, when the mounting height of the cutting-edge unit 200 changes. In the conventional example without an actuation speed adjustment function, as a line L1 showed, when the mounting height of the cutting-edge unit 200 which is the mode which a person with the weak skin and a person with a thin mustache originally use was in a high location, there was an inclination for the actuation speed of the inner cutting edge 4 to become a high speed, and for per skin to worsen. Conversely, there was an inclination for the actuation speed of the inner cutting edge 4 to fall, and for sharpness to worsen in the mode which has the cutting-edge unit 200 which a person with a mustache deep originally and those who want to ***** want to use powerfully at a quicker actuation speed in a low location.

[0048] Then, as the line L2 of drawing 14 shows, when per skin worsens when the mounting height of the cutting-edge unit 200 is in a high location by making it the mounting height of the cutting-edge unit 200 interlocked with, adjusting the actuation speed of the inner cutting edge 4, and controlling to become a fixed actuation speed in every mounting height, or it is in a low location, the evil in which sharpness worsens can be abolished.

[0049] Next, as another means which keeps constant the actuation speed of the inner cutting edge 4 regardless of the mounting height of the cutting-edge unit 200, the actuation speed of a motor 3 is detected and there is also a method of keeping the actuation speed of a motor 3 constant. In this operation gestalt using the motor 3 shown in drawing 1 - drawing 9, by detecting the reverse electromotive voltage by motorised, it can control so that the actuation speed of a motor 3 becomes fixed, and thereby, the actuation speed of the inner cutting edge 4 can be kept constant.

[0050] Moreover, as the line L3 of drawing 14 shows, when the mounting height of the cutting-edge unit 200 is a high location, actuation speed of the inner cutting edge 4 is made into a low speed, and you may make it adjust at the time of a low location, so that it may become a high speed. In this case, when the mounting height of the cutting-edge unit 200 is in a high location, per skin becomes good and can improve sharpness more at the time of a low location.

[0051] In drawing 15 - drawing 26, the operation gestalt of further others of this invention is explained. The pedestal 105 holding a battery 102 and a motor 103 like a linear motor, a battery 102 and a motor 3, and the circuit board 126 is stored in the interior of this tubed body housing 1. The actuation child 112 who transmits driving force to the inner cutting edge 104 in the upper part is formed in the motor 3.

[0052] Where the lower part of a motor 103 and the upper part of a pedestal 105 are combined, opening is plugged up with a discharge ring 107 from the cutting-edge mount 106 from the body housing 101 upside, and the bottom, and it is fixed with screws 127 and 141. The cutting-edge mount 106 closes the upper part of the body housing 101, and the lower part of the body housing 101 is made into the structure which plugs up opening with a discharge ring 107.

[0053] The front face of the body housing 101 is equipped with the switch base 109 for stopping a switch 108 and a switch 108 in the body housing 101 free [a slide], and it considers as the configuration which arranged Tolima 110 free [a slide] in the tooth back of the body housing 101. The rubber pressure plate 111 is fixed to the upper part of the cutting-edge mount 106 using a screw 127.

[0054] As shown in drawing 20, there is opening in the cutting-edge mount 106 and the rubber pressure plate 111, respectively, the actuation child 112 of a motor 3 penetrates the opening, the inside O ring section 148 of actuation child water proof rubber 113 fits into the actuation child's 112 water seal section 149, and it is considering as the structure where the periphery section 150 of actuation child water proof rubber 113 is inserted into the cutting-edge mount 106 and the rubber pressure plate 111.

[0055] Moreover, the cutting-edge mount 106 and the body housing 101 sandwich O ring 128 in the pars intermedia, and are fixed on both sides of a front panel and a top ring with the up side. By really fabricating rubber in the periphery section and the screw hole section used as a mating face with the body housing 101, or assembling it on both sides of O ring 123 in them, a discharge ring 107 can consider the body housing 101 interior as water proof.

[0056] the inner cutting-edge Oshiage spring 132 (drawing 21) arranges in the actuation child 112 with the spring stop member 140 -- having -- **** -- the elasticity -- always -- the outside cutting edge 14 -- receiving -- the inner cutting edge 4 -- it can push -- moreover -- an actuation child's side face for an actuator -- the Tolima driving rod 115 and the slit cutting-edge driving rod 151 -- anchoring -- it enables it to transmit actuation to the Tolima cutting edge and a slit cutting edge, respectively

- [0057] The head section consists of cutting-edge frames which become an order outside from two network cutting-edge cassettes and the maintenance cassette 118 which supports slit cutting-edge units and these cutting-edge units possible [a float] in the center.
- [0058] A network cutting-edge unit attaches network covering in the inner cassette 116 which carried out heat-sealing immobilization of the outside cutting edge 114 and the outside cutting edge 114, and is united with it.
- [0059] The slit cutting-edge unit consists of the cutting edge 144 outside a slit, the cutting edge 152 in a slit, a slit joint 143, a slit Oshiage spring 145, and a slit attachment component 146, and is held free [a float] through the slit float spring 147 at the maintenance cassette 118.
- [0060] A network cutting-edge unit is held free [a float], when the rib 166 of the network covering 142 engages with the engagement slot 165 of the maintenance cassette 118.
- [0061] The hook section 168 prepared in the slit attachment component 146 and the height 167 prepared in maintenance cassette 118 inner surface are engaged, and a slit cutting-edge unit is held free [a float to the maintenance cassette 118] in the condition of having been energized up with the slit Oshiage spring 145. To this maintenance cassette 118, it is detaching and attaching by forming the engagement hook 120 for performing attachment and detachment with a body in two longitudinal direction ends.
- [0062] The body side is arranging the change plate 121 in the vertical direction movable in the location surrounded by the periphery of the cutting-edge mount 106, and the inner circumference of the body housing 101. The block diagram of this example is shown in drawing 28 .
- [0063] The body housing 1 side is arranging the change plate (slide plate) 121 in the location surrounded by the periphery of the cutting-edge mount 6, and the inner circumference of a front panel 29 in the vertical direction. The change plate 121 is carrying out the shape of a typeface of abbreviation KO, the edge projects up, and a height 169 penetrates the hole 170 prepared in the cutting-edge mount 106, and projects from a top face. The stop hole 122 for engaging with the engagement hook 120 of the maintenance cassette 118 is formed.
- [0064] The ring 133 which consists of elastic bodies, such as rubber for preventing trespass of mustached waste, is attached in the perimeter of the height 169 of the change plate 121. The engagement hole 171 for attaching the rack member 136 is formed near [the] the center, and it engages with the engagement projection 172 of the rack member 136, and is combined with the front section of the change plate 121 with caulking.
- [0065] The rack slots 136a and 136b (drawing 20) are formed in the right-and-left both sides, the slowdown gear 135 meshed on the left-hand side, and, on the right-hand side, as for the rack member 136, the cam lever 138 has geared.
- [0066] While the slowdown gear 135 serves as a partial gearing with which the gear of a narrow diameter portion 173 and a major diameter 174 is constituted in the same thickness, the engagement hole 175 established in the core of a narrow diameter portion 173 engages with the projection 176 of the cutting-edge mount 106 free [a revolution] and the gear of a narrow diameter portion 173 meshes with the rack member 136, the major diameter 174 has geared with the actuation gear 131.
- [0067] The actuation gear 131 is in the condition which combined with the height of an operating button 130 and was united, is in the condition positioned in the circular hole constituted by body housing 101 front face and the crevices 177 and 178 of the upside panel 129, and is held free [a revolution] to the body housing 101. By assembling a body 301, by gearing and rotating the actuation gear 131, the slowdown gear 135 can rotate and the actuation gear 131 and the slowdown gear 135 can move the change plate 121 up and down through the rack member 136 in this condition. Moreover, when the maintenance cassette 118 is assembled in this condition, the whole cutting-edge frame will move up and down.
- [0068] A body side arranges the change plate 121 movable in the vertical direction in the location surrounded by the periphery of the cutting-edge mount 106, and the inner circumference of the body housing 101, and while the maintenance cassette 118 can be detached and attached by establishing the stop hole 122 for maintenance cassette 118 attachment and detachment in the location corresponding to the engagement hook 120 of the maintenance cassette 118, the outside cutting edge 14 can be gone up and down by going up and down the change plate 121.
- [0069] As a device for making the change plate 121 slide in the vertical direction, the operating button 130 of the rotating type which equipped the inner surface with the gear is held free [a revolution] on the outside of the body housing 101. Combine formation or the rack member 136 with the change plate 121 for the rack member 136 in a front face, and further, while making the slowdown gear 135 engaged between this rack member 136 and the actuation gear 131 in the inner surface side of an operating button 130 By turning an operating button 130, power can be transmitted through the actuation gear 131 and the rack member 136, the change plate 121 can be made to be able to slide in the vertical direction, and the mounting height of the outside cutting edge 14 can be changed.

[0070] The cam lever 138 prepared in the right-hand side of the rack member 136 is engaging with the hole 183 of the front face of the cutting-edge mount 106 free [a revolution] through O ring 134, and the engagement rib 184 is formed at the head of a cam lever 138, and it is engaging with the slot 185 of the switch cam 137 arranged in the body housing 101.

[0071] The height 186 prepared in the background of a slot 185 is engaging with the hole 187 of motor 3 front face free [a revolution], and the long slot 188 has combined the switch cam 137 free [the height 189 of the change lever 139, and a revolution] by the right flank. As for the change lever 139, the engagement slot 190 of the upper part of a motor 3 and the height 191 on a background are held for the upper bed section free [vertical movement] to a motor 3, when the engagement hole 192 and each of motor 3 front face are engaged.

[0072] By this configuration, migration of the rack member 136 can move the change lever 139 up and down through a cam lever 138 and the switch cam 137.

[0073] Drawing 22 – drawing 26 show an example of a motor control means. An example of the block diagram of this example is shown in drawing 29 and drawing 30 .

[0074] The conductive brush A is arranged at the point of the change lever 139, a motion of the change lever 139 will be followed and drawing 22 will be gone up and down, if the location of the cutting-edge unit 200 is changed. On the other hand on the circuit board B installed by the circuit board 126, the electric conduction pattern C located in a line with fixed spacing is printed, and the encoder E short-circuited with the brush of conductivity two points in it is constituted. And the location of the cutting-edge unit 200 is detectable by detecting by IC (D) which pattern short-circuited. IC (D) controls the current passed on a motor 3 according to the amount of detection, and adjusts the actuation speed of a motor 3. Moreover, the attaching position of the cutting-edge unit 200 is more detectable to accuracy by detecting the location of the change lever 139 combined with the cutting-edge unit 200 rather than it detects the location of an operating button.

[0075] Drawing 23 shows other examples. Here, a light emitting device N and a photo detector O are arranged two or more sense in all on the axis which intersects the change lever 139. When the change lever 139 moves downward, the lower part of the change lever 139 will enter between a light emitting device N and a photo detector O, and will interrupt the beam of light which a photo detector O receives. Therefore, how many photo detectors can detect the location of the change lever 139, i.e., the location of the cutting-edge unit 200, for a beam of light depending on whether it is a carrier beam. IC (D) controls the current passed on a motor 3 according to the amount of detection, and adjusts the actuation speed of a motor 3.

[0076] Two or more switches F and G are arranged at notching of the change lever 139, the change lever 139 will move up and down, and drawing 24 will carry out ON/OFF of the switches F and G, if the location of the cutting-edge unit 200 is changed. When had in the location where the change lever 139 is the highest (i.e., when the location of the cutting-edge unit 200 is located in the highest location), both the switches F and G serve as OFF. When the change lever 139 is in the mid-position, namely, when the location of the cutting-edge unit 200 is located in the mid-position, ON and Switch G serve as [Switch F] OFF. When the change lever 139 is in the lowest location (i.e., when the location of the cutting-edge unit 200 is located in the lowest location), both the switches F and G serve as ON. Thus, the location of the cutting-edge unit 200 is detectable in the height of a three-stage. A control section controls the current passed on a motor 3 according to the amount of detection, and adjusts the actuation speed of a motor 3.

[0077] Drawing 25 is constituted so that the resistor H which constitutes a variable resistor 310 may be arranged at the tooth back of the change lever 139, the cutting-edge unit 200 may follow on it up and down and it may move to it simultaneously with the change lever 139. On the other hand, on the circuit board B, the electric conduction pattern I is printed so that Resistor H may be contacted, and if the change lever 139 moves up and down, the resistance between lead-wire J and the electric conduction pattern I will change. This resistance is connected with the motor 3 at the serial, and when the location of the cutting-edge unit 200 is low, resistance is low, and it acts so that the actuation speed of a motor 3 may become quick. Conversely, when the location of the cutting-edge unit 200 is high, resistance is high, and it acts so that the actuation speed of a motor 3 may become slow.

[0078] Drawing 26 arranges the rotary volume K used as a variable resistor 300 on an operating button 130, the actuation gear 131, and the same axle, and it constitutes it so that it may move at a revolution and coincidence of an operating button. An example of the block diagram of this example is shown in drawing 30. The resistance of the rotary volume K changes with the revolutions of an operating button. Since this resistance is ***(ed) by the motor 3 and the serial, when the location of the cutting-edge unit 200 is low, resistance is low, and it acts so that the actuation speed of a motor 3 may become quick. Conversely, when the location of the cutting-edge unit 200 is high, resistance is high, and it acts so that the actuation speed of a motor 3 may become slow.

[0079]

[Effect of the Invention] If it is in invention according to claim 1 as mentioned above In the electric shaver with which adjustment of the mounting height of a cutting-edge unit of the cutting-edge unit equipped with the outside cutting edge was attained to the body that it can float